

MARYLAND DEPARTMENT OF THE ENVIRONMENT

Lead Poisoning Prevention Program

Childhood Blood Lead Surveillance in Maryland

2003 Annual Report

October, 2004



MARYLAND CHILDHOOD LEAD REGISTRY
2003 ANNUAL SURVEILLANCE REPORT

EXECUTIVE SUMMARY

The Maryland Department of the Environment's statewide Childhood Lead Registry (CLR) performs childhood blood lead surveillance for Maryland. The CLR receives the reports of all blood lead tests done on Maryland children 0 - 18 years of age, and provides blood lead test results to local health departments as needed for case management and planning.

Since 1995, the registry has released a comprehensive annual report on statewide childhood blood lead testing. This current report presents the childhood blood lead test results for calendar year 2003 (CY 2003). All numbers are based on blood lead testing on children. The CLR does not receive any reports on lead screening based on the lead risk assessment questionnaire.

CY 2003 Surveillance Highlights:

New data management system instituted. The Childhood Lead Registry is now maintained in the "Systematic Tracking of Elevated Lead Levels and Remediation" (STELLAR) surveillance system, obtained from Centers for Disease Control (CDC) Lead Poisoning Prevention Program. Movement from the original flat file database system into the new relational database system improves data quality and timeliness. It is now possible to trace one child's blood lead tests over time.

Testing showed a slight decrease statewide, but an increase in highest risk areas such as Baltimore City.

The number of children with elevated blood leads in 2003 decreased compared to 2002. The number of children with blood lead levels above 10 µg/dL, CDC's level of concern, decreased to 1,719 or 2.2 % of children tested statewide from 2,297 or 2.9% in 2002. Children with blood lead levels of 20 µg/dL and above, or "significant elevations", decreased to 237 from 260 but the percentage remained at 0.3% of children tested statewide.

OVERVIEW

LEAD POISONING IN MARYLAND

Lead is one of the most significant and widespread environmental hazards for children in Maryland. Children are at the greatest risk from birth to age six while their neurological systems are being developed. Exposure to lead can cause long-term neurological damage that may be associated with learning and behavioral problems and with lowered intelligence.

There has been a steady decline in childhood lead poisoning in Maryland over the past decade at all levels of exposure (Fig. 1, 2). The reduction has occurred both statewide and in areas of highest risk such as Baltimore City.

Sources of Childhood Lead Exposure

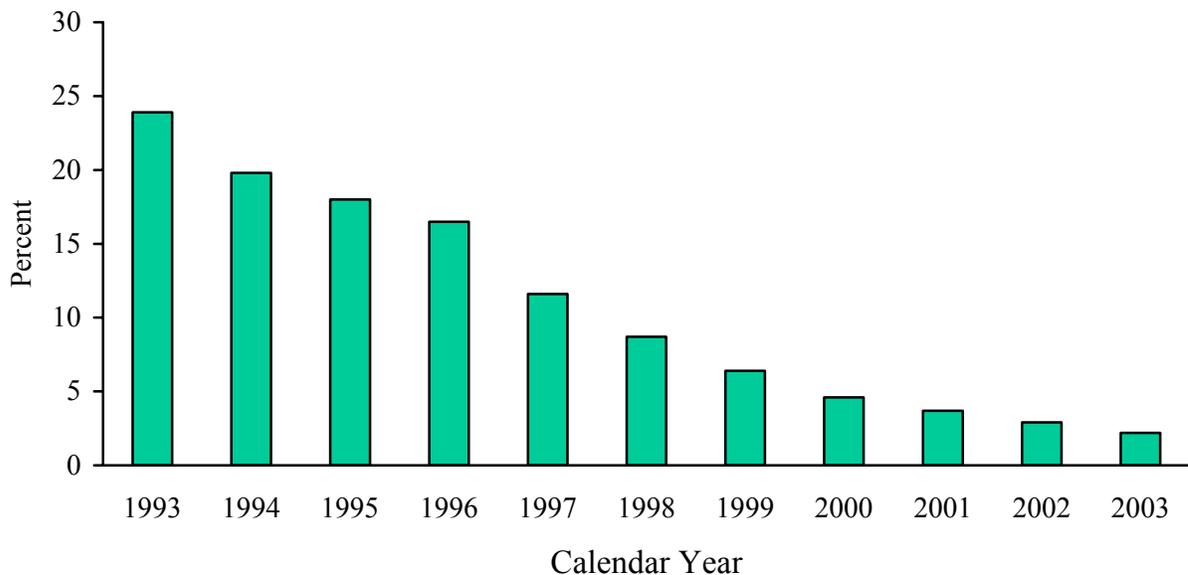
Lead paint dust from deteriorated lead paint or from renovation is the major source of exposure for children in Maryland. According to the US 2000 census, there are about 439,000 residential houses built before 1950 (95% likely to contain lead paint) and 692,000 houses built between 1950-1978 (75% likely to have lead paint).

Water, air, and soil, may provide low-level, "background" exposure, but rarely may cause childhood lead poisoning.

Imported products, parental occupations, hobbies, and imported traditional medicines occasionally may cause lead exposure among children.

Figure 1

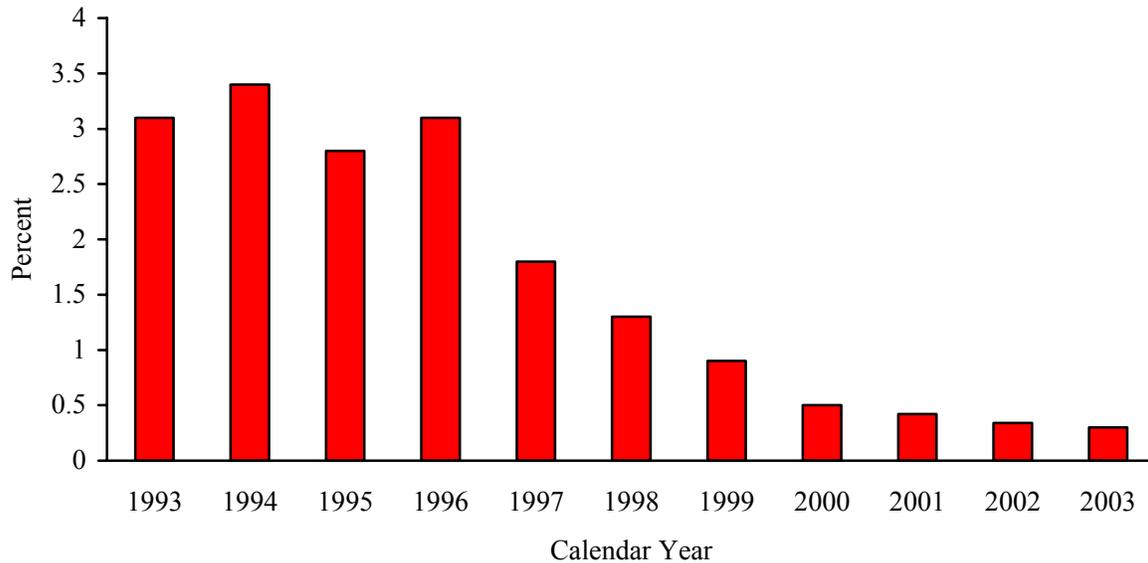
Percent of Children Tested With Elevated Blood Lead Level*



* Children 0-72 months old with highest venous blood lead test (capillary if no venous) ≥ 10 $\mu\text{g}/\text{dL}$ for each year.
Source: Maryland Department of the Environment, Lead Poisoning Prevention Program, Childhood Lead Registry, Statewide data: 1993-2003

Figure 2

Percent of Children Tested With Lead Poisoning*



* Children 0-72 months old with a venous blood lead test ≥ 20 $\mu\text{g}/\text{dL}$ for each year.

Source: Maryland Department of the Environment, Childhood Lead Registry, and Statewide data: 1993-2003

Much of the decline in blood lead levels is the result of lead poisoning prevention efforts. Increased enforcement of Maryland's "Reduction of Lead Risk in Housing" law, increased awareness by parents and property owners of the hazards of lead poisoning, and improved maintenance of rental housing. Other factors contributing to the decline of blood lead levels are the movement of families away from older housing into more recently built city or suburban housing, and outreach and education to families and health care providers. .

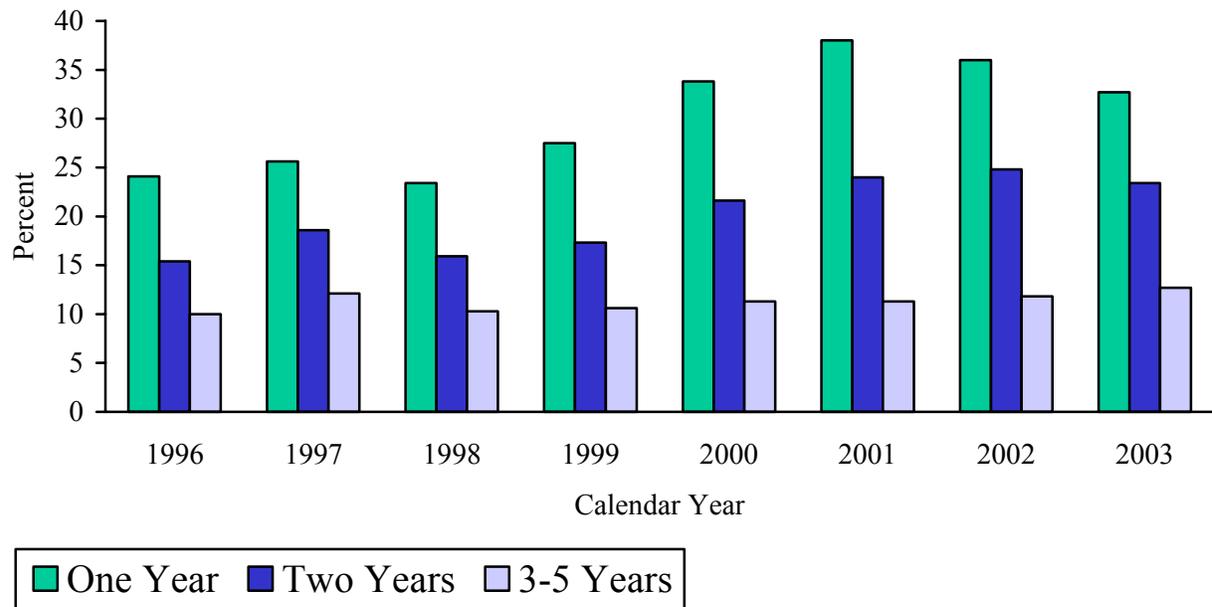
State laws and regulations with impact on childhood lead poisoning

- ✓ Requirements to perform lead hazard reduction at each turnover in rental housing built before 1950. [Environment Article (EA) §6-8]
- ✓ Outreach programs to parents, health care providers, and property owners, especially in at-risk areas. [EA§ 6-8, Health Article §18-106]

Maryland requires that children living in “at-risk” areas be tested at ages one and two years. The State has a targeted testing plan that identifies “at-risk areas.” Universal blood lead testing applies to Baltimore City children (Ordinance 20 effective July 2000) and children on Medicaid (covered by EPSDT). The percentage of one and two year old children tested increased for the last 5 years. (Fig. 3). The increase in the testing of pre-school aged children can probably be attributed to parents and healthcare providers’ response to the new school enrollment testing requirement in Health Article 18-106 which became effective for the school year starting September 2003.

Figure 3

Percent of children one and two years tested for lead vs. children of other ages
 Children 0-72 months old with highest blood lead test for each year.



Source: Maryland Department of the Environment, Childhood Lead Registry, Statewide data: 1996-2003.

Identifying Children with Lead Exposure

The critical issue in childhood lead poisoning is early detection. Because there are no specific clinical symptoms, a blood lead test is the most reliable technique to identify children with elevated blood lead levels. If there is any suspicion that a child is exposed to lead, do a blood lead test.

Maryland's Lead Poisoning Prevention Program has well-established case management and environmental investigation protocols for follow-up of lead poisoned children. Table One is a summary of Maryland's case management protocol.

Table One: Case Management Protocol

Environmental investigations are required at 2 consecutive venous levels of $\geq 15 - 19 \mu\text{g/dL}$ or 1 venous level at $\geq 20 \mu\text{g/dL}$.

Blood Lead Level	Local Health Department	Health Care Provider	Statewide Law Enforcement
< 9 $\mu\text{g/dL}$	Anything above zero indicates some exposure or contact with lead. No Community Health Nurse case management services are indicated.	<ul style="list-style-type: none"> • General education about lead and lead poisoning • Risk Assessment Questionnaire at all routine child health visits • Repeat blood lead level according to protocol 	Footnote 2
10 – 14 $\mu\text{g/dL}$	This is the CDC <u>level of concern</u> . Provide education to decrease exposure, including information about Special Loans Housing Program.	As above plus <ul style="list-style-type: none"> • Educate to decrease exposure • Track blood lead levels according to CDC protocol 	
15 – 19 $\mu\text{g/dL}$	If capillary test, coordinate with provider and guardian to validate with a venous blood lead test within 1 month. If venous test <ul style="list-style-type: none"> • Make telephone contact and do home visit within 30 days. • Provide educational materials to family (mail or in person) • Send Official Notice of Elevated Blood Lead, when applicable, to Tenant and Rental Property Owner • Coordinate with the provider and guardian for follow-up activities, such as housing and follow-up blood tests If two consecutive venous tests between 15-19 $\mu\text{g/dL}$ at least 30 days of each other, treat as next level.	As above plus <ul style="list-style-type: none"> • Evaluate for iron deficiency • Take environmental history 	As in footnote 2, plus MDE enforcement of Lead Risk in Housing law’s subsections on Notice of Elevated Blood Lead
20 – 44 $\mu\text{g/dL}$	If capillary test, coordinate validation of level with a venous blood lead level within 1 week If venous test. <ul style="list-style-type: none"> • Contact and make a home visit in coordination with the Environmental Lead Sanitarian who will complete an environmental investigation within 5 working days • Discuss with the health care provider possible referral to tertiary care centers specializing in management of childhood lead poisoning • Provide appropriate referrals to other agencies (Social Services, Housing, etc.) 	As above plus <ul style="list-style-type: none"> • Complete medical/nutritional history and physical examination • Obtain developmental / psychological evaluation • Consider chelation consultation 	As above, plus MDE and local health department enforcement of <ul style="list-style-type: none"> • Notice of Violations • Lead Risk in Housing law, subsections on Qualified Offer
$\geq 45 \mu\text{g/dL}$	If capillary, contact provider within 2 working days. Inform provider to mark all specimens STAT (Highest Priority) and request immediate processing and report from laboratory. If venous, contact provider within 1 working day. Home visit within 2 working days.	As above plus <ul style="list-style-type: none"> • Consult with lead specialist • Perform urgent chelation 	
> 70 $\mu\text{g/dL}$	Contact the health care provider within 24 hours. If capillary, confirm the result immediately with a STAT venous test. If venous, verify hospitalization as a medical emergency. Same as above. Home visit within 1 working day.	Hospitalize: Medical emergency:	

1) Maryland Department of the Environment Protocol, based on Centers for Disease Control and Prevention guidance

2) Environment Article §6-8, “Reduction of Lead Risk in Housing” subsections on Rental Property Registration, Risk Reduction Treatments at Turnover and Notice of Defect are ongoing primary prevention activities not triggered by blood lead levels.

Blood Lead Laboratory Reporting Requirement

The amended law and regulations* of 2001 and 2002 require that:

1-Following child's demographic data should be included in each blood lead test reported:

- Date of Birth
- Sex
- Address
- Test date
- Sample type
- Blood lead level

2- Blood lead results ≥ 20 $\mu\text{g/dL}$ to be reported (fax) within 24 hours after result is known. All other results to be reported every two weeks.

3- Reporting format should comply with the format designed and provided by the Registry.

4- Data should be provided electronically.

* EA 6-303, Blood lead test reporting (COMAR 26.02.01, Blood lead test reporting)

In calendar year 2003, 76,721 children 0-72 months were tested for lead exposure statewide. Table Two provides summary statewide statistics of blood lead testing in 2003, and Table Three provides the breakdown of blood lead testing and the status of lead poisoning by jurisdiction in 2003. Table Three-A provides numbers of children by age groups of 0-35 months and 36-72 months. Table Four shows summary results for 8 years at the State, Baltimore City and Counties levels.

Table Two
Calendar Year (CY) 2003 Statistical Report¹

Item	Number	Percent (%)
Number to tests	97,194 ²	
Number of children	76,721	100.0
Age		
Under One	8,234	10.7
One Year	24,071	31.4
Two Years	16,553	21.6
Three Years	9,604	12.5
Four Years	10,145	13.2
Five Years	8,114	10.6
Age Unknown ³	0	0.0
Highest Blood Lead Level (µg/dL)		
0-9	75,002	97.7
10-14	1,131	1.5
15-19	331	0.4
20-24	128	0.2
>=25	129	0.2
Mean BLL (Geometric mean)	2.3	
Blood Specimen		
Capillary	11,598	15.1
Venous	60,649	79.1
Undetermined ⁴	4,474	5.8

1. For detailed analysis and breakdown of data refer to Supplementary Data Tables 1-5.
2. The 97,194 tests were from 92,382 children 0-18 years, of whom 76,721 were 0-72 months old. Data in this statistical table is based on children 0-72 months.
3. Children with wrong or missing date of birth were assumed to be under six years of age.
4. In further analyses, if the laboratory reported the specimen type as unknown, the blood specimen was counted as capillary.

Table Three
Maryland Department of the Environment
Lead Poisoning Prevention Program: Childhood Lead Registry

Blood Lead Testing of Children 0-72 Months by Jurisdiction in 2003

County ¹	Population of children 0-72 months old ²	Children Tested ³		Children with Elevated Blood Lead Level ⁴		Children with Lead Poisoning ⁵	
		Number	Percent	Number	Percent	Number	Percent
Allegany	4,234	1,315	31.1	30	2.3	5	0.4
Anne Arundel	40,844	5,029	12.3	20	0.4	1	0.0
Baltimore	54,933	10,427	19.0	120	1.2	18	0.2
Baltimore City	51,892	18,242	35.2	1,166	6.4	160	0.9
Calvert	6,209	682	11.0	2	0.3	0	0.0
Caroline	2,270	796	35.1	14	1.8	3	0.4
Carroll	11,801	1,040	8.8	14	1.3	2	0.2
Cecil	7,127	959	13.5	9	0.9	2	0.2
Charles	11,023	1,391	12.6	2	0.1	0	0.0
Dorchester	1,952	540	27.7	26	4.8	5	0.9
Frederick	17,641	1,630	9.2	16	1.0	2	0.1
Garrett	2,020	429	21.2	3	0.7	0	0.0
Harford	18,482	2,674	14.5	19	0.7	2	0.1
Howard	22,193	1,688	7.6	8	0.5	2	0.1
Kent	1,041	157	15.1	3	1.9	0	0.0
Montgomery	76,648	10,163	13.3	53	0.5	9	0.1
Prince George's	73,788	12,426	16.8	77	0.6	7	0.1
Queen Anne's	3,123	495	15.8	5	1.0	2	0.4
Saint Mary's	7,827	903	11.5	9	1.0	0	0.0
Somerset	1,457	544	37.3	18	3.3	5	0.9
Talbot	2,111	449	21.3	15	3.3	1	0.2
Washington	9,737	1,971	20.2	15	0.8	3	0.2
Wicomico	6,594	2,031	30.8	50	2.5	7	0.3
Worcester	3,022	731	24.2	24	3.3	1	0.1
County Unknown		9		1		0	
Total	437,968	76,721	17.5	1,719	2.2	237	0.3

1. County assignment in the order of priority was based on child's census tract, child's zip code address, and provider's zip code address.
2. Adapted from US Census population estimate for 2003.
3. Blood lead reports with missing or wrong date of birth were assumed to be from children under six (6) years of age with exact age unknown.
4. Any blood lead level ≥ 10 $\mu\text{g/dL}$
5. Defined as a venous blood lead level ≥ 20 $\mu\text{g/dL}$

Table Three-A
Maryland Department Of The Environment
Lead Poisoning Prevention Program: Childhood Lead Registry
Blood Lead Testing of Children 0-72 months by Jurisdiction in 2003

Age Group	Population of children	Children Tested		Children with Elevated Blood Lead Level		Children with Lead Poisoning	
		Number	Percent	Number	Percent	Number	Percent
<u>Allegany County</u>							
0-35 Months	2,109	956	45.3	23	2.4	3	0.3
36-72 Months	2,125	359	16.9	7	1.9	2	0.6
Total	4,234	1,315	31.1	30	2.3	5	0.4
<u>Anne Arundel County</u>							
0-35 Months	20,293	3,642	17.9	14	0.4	1	0.0
36-72 Months	20,551	1,387	6.7	6	0.4	0	0.0
Total	40,844	5,029	12.3	20	0.4	1	0.0
<u>Baltimore County</u>							
0-35 Months	27,072	5,962	22.0	67	1.1	11	0.2
36-72 Months	27,861	4,465	16.0	53	1.2	7	0.2
Total	54,933	10,427	19.0	120	1.2	18	0.2
<u>Baltimore City</u>							
0-35 Months	26,607	11,613	43.6	647	5.6	94	0.8
36-72 Months	25,285	6,629	26.2	519	7.8	66	1.0
Total	51,892	18,242	35.2	1,166	6.4	160	0.9
<u>Calvert County</u>							
0-35 Months	2,935	558	19.0	1	0.2	0	0.0
36-72 Months	3,275	124	3.8	1	0.8	0	0.0
Total	6,209	682	11.0	2	0.3	0	0.0
<u>Caroline County</u>							
0-35 Months	1,043	500	47.9	10	2.0	1	0.2
36-72 Months	1,227	296	24.1	4	1.4	2	0.7
Total	2,270	796	35.1	14	1.8	3	0.4
<u>Carroll County</u>							
0-35 Months	5,523	681	12.3	12	1.8	1	0.1
36-72 Months	6,277	359	5.7	2	0.6	1	0.3
Total	11,801	1,040	8.8	14	1.3	2	0.2
<u>Cecil County</u>							
0-35 Months	3,457	556	16.1	7	1.3	1	0.2
36-72 Months	3,670	403	11.0	2	0.5	1	0.2
Total	7,127	959	13.5	9	0.9	2	0.2

Table Three-A
Maryland Department Of The Environment
Lead Poisoning Prevention Program: Childhood Lead Registry
Blood Lead Testing of Children 0-72 months by Jurisdiction in 2003

Age Group	Population of children	Children Tested		Children with Elevated Blood Lead Level		Children with Lead Poisoning	
		Number	Percent	Number	Percent	Number	Percent
<u>Charles County</u>							
0-35 Months	5,316	903	17.0	2	0.2	0	0.0
36-72 Months	5,706	488	8.6	0	0.0	0	0.0
Total	11,023	1,391	12.6	2	0.1	0	0.0
<u>Dorchester County</u>							
0-35 Months	956	351	36.7	18	5.1	4	1.1
36-72 Months	996	189	19.0	8	4.2	1	0.5
Total	1,952	540	27.7	26	4.8	5	0.9
<u>Frederick County</u>							
0-35 Months	8,505	1,106	13.0	11	1.0	2	0.2
36-72 Months	9,135	524	5.7	5	1.0	0	0.0
Total	17,641	1,630	9.2	16	1.0	2	0.1
<u>Garrett County</u>							
0-35 Months	967	205	21.2	2	1.0	0	0.0
36-72 Months	1,053	224	21.3	1	0.4	0	0.0
Total	2,020	429	21.2	3	0.7	0	0.0
<u>Harford County</u>							
0-35 Months	8,819	1,417	16.1	14	1.0	2	0.1
36-72 Months	9,663	1,257	13.0	5	0.4	0	0.0
Total	18,482	2,674	14.5	19	0.7	2	0.1
<u>Howard County</u>							
0-35 Months	10,493	1,133	10.8	6	0.5	1	0.1
36-72 Months	11,700	555	4.7	2	0.4	1	0.2
Total	22,193	1,688	7.6	8	0.5	2	0.1
<u>Kent County</u>							
0-35 Months	530	129	24.3	3	2.3	0	0.0
36-72 Months	511	28	5.5	0	0.0	0	0.0
Total	1,041	157	15.1	3	1.9	0	0.0
<u>Montgomery County</u>							
0-35 Months	38,232	6,759	17.7	31	0.5	5	0.1
36-72 Months	38,416	3,404	8.9	22	0.6	4	0.1
Total	76,648	10,163	13.3	53	0.5	9	0.1

Table Three-A
Maryland Department Of The Environment
Lead Poisoning Prevention Program: Childhood Lead Registry
Blood Lead Testing of Children 0-72 months by Jurisdiction in 2003

Age Group	Population of children	Children Tested		Children with Elevated Blood Lead Level		Children with Lead Poisoning	
		Number	Percent	Number	Percent	Number	Percent
<u>Prince George's County</u>							
0-35 Months	36,327	7,465	20.5	43	0.6	5	0.1
36-72 Months	37,461	4,961	13.2	34	0.7	2	0.0
Total	73,788	12,426	16.8	77	0.6	7	0.1
<u>Queen Anne's County</u>							
0-35 Months	1,503	372	24.7	4	1.1	2	0.5
36-72 Months	1,620	123	7.6	1	0.8	0	0.0
Total	3,123	495	15.8	5	1.0	2	0.4
<u>Saint Mary's County</u>							
0-35 Months	3,797	724	19.1	9	1.2	0	0.0
36-72 Months	4,030	179	4.4	0	0.0	0	0.0
Total	7,827	903	11.5	9	1.0	0	0.0
<u>Somerset County</u>							
0-35 Months	710	371	52.2	10	2.7	3	0.8
36-72 Months	747	173	23.2	8	4.6	2	1.2
Total	1,457	544	37.3	18	3.3	5	0.9
<u>Talbot County</u>							
0-35 Months	986	340	34.5	13	3.8	1	0.3
36-72 Months	1,125	109	9.7	2	1.8	0	0.0
Total	2,111	449	21.3	15	3.3	1	0.2
<u>Washington County</u>							
0-35 Months	4,811	1,239	25.8	9	0.7	2	0.2
36-72 Months	4,926	732	14.9	6	0.8	1	0.1
Total	9,737	1,971	20.2	15	0.8	3	0.2
<u>Wicomico County</u>							
0-35 Months	3,301	1,414	42.8	31	2.2	4	0.3
36-72 Months	3,293	617	18.7	19	3.1	3	0.5
Total	6,594	2,031	30.8	50	2.5	7	0.3
<u>Worcester County</u>							
0-35 Months	1,562	457	29.3	16	3.5	0	0.0
36-72 Months	1,460	274	18.8	8	2.9	1	0.4
Total	3,022	731	24.2	24	3.3	1	0.1

Table Three-A
Maryland Department Of The Environment
Lead Poisoning Prevention Program: Childhood Lead Registry
Blood Lead Testing of Children 0-72 months by Jurisdiction in 2003

Age Group	Population of children	Children Tested		Children with Elevated Blood Lead Level		Children with Lead Poisoning	
		Number	Percent	Number	Percent	Number	Percent
<u>County Unknown</u>							
0-35 Months		5		1		0	
36-72 Months		4		0		0	
Total		9		1		0	

Statewide

0-35 Months	215,855	48,858	22.6	1,004	2.1	143	0.3
36-72 Months	222,113	27,863	12.5	715	2.6	94	0.3
Total	437,968	76,721	17.5	1,719	2.2	237	0.3

1. Population of children was adapted from US Census Bureau.
2. Blood lead reports with missing or wrong date of birth were assumed to be from children under six (6) years of age with exact age unknown.
3. Elevated blood lead level defined as any blood lead level ≥ 10 $\mu\text{g/dL}$.
4. Lead poisoning defined as a venous blood lead level ≥ 20 $\mu\text{g/dL}$.
5. County assignment was in the order of child's census tract address, child's zip code address, and provider's zip code address.

Table Four
Maryland Department of the Environment
Childhood Blood Lead Surveillance in Maryland: 1996-2003

Calendar Year		Population of Children	Blood Lead Tests		Elevated Blood Lead		Lead Poisoning	
			Number	Percent	Number	Percent	Number	Percent
1996	City	60,834	29,630	48.7	7,816	26.4	1,646	5.6
	Counties	369,538	27,006	7.3	1,264	4.7	160	0.6
	Unknown		3,110		804		24	
	Total	430,372	59,746	13.9	9,884	16.5	1,830	3.1
1997	City	58,262	21,423	36.8	5,983	27.9	1030	4.8
	Counties	362,935	44,546	12.3	1654	3.7	202	0.5
	Unknown		1,149		126		1	
	Total	421,197	67,118	15.9	7,763	11.6	1233	1.8
1998	City	56,759	17,753	31.3	3,949	22.2	669	3.8
	Counties	359,726	40,164	11.1	1,082	2.7	103	0.3
	Unknown		668		37		0	
	Total	416,485	58,585	14.1	5,068	8.7	772	1.3
1999	City	55,401	17,414	31.4	2,902	16.7	446	2.6
	Counties	363,511	43,524	12.0	925	2.1	102	0.2
	Unknown		591		77		7	
	Total	418,912	61,529	14.7	3,904	6.4	555	0.9
2000	City	50,380	18,033	36.8	2,198	12.2	266	1.5
	Counties	377,559	51,210	13.6	847	1.7	85	0.2
	Unknown		5,273		357		2	
	Total	427,939	74,516	17.4	3,402	4.6	353	0.5
2001	City	50,380	21,231	42.1	2,027	9.5	230	1.1
	Counties	377,559	55,470	14.7	814	1.5	58	0.1
	Unknown		41		0		0	
	Total	427,939	76,742	17.9	2,841	3.7	288	0.4
2002	City	52,744	16,595	31.5	1,558	9.4	183	1.1
	Counties	384,073	62,822	16.4	737	1.2	77	0.1
	Unknown		90		2		0	
	Total	436,817	79,507	18.2	2,297	2.9	260	0.3
2003	City	51,892	18,242	35.2	1,166	6.4	160	0.9
	Counties	386,076	58,470	15.1	551	0.9	77	0.1
	Unknown		9		2		0	
	Total	437,968	76,721	17.5	1,719	2.2	237	0.3

Notes:

1. Population for 1996-1999 is based on the US Census Bureau annual population estimate for states and counties by sex and single year age. Population for 2000 and 2001 both used the US 2000 population count, as the Census Bureau did not release population estimate for 2001 by 11/2002. Population for 2002 and 2003 were adapted from the US Census Bureau annual population estimate for states and counties by sex and five-year age interval.
2. Elevated blood lead is defined as a venous or a capillary blood lead level ≥ 10 $\mu\text{g/dL}$.
3. Lead poisoning is defined as a venous blood lead level ≥ 20 $\mu\text{g/dL}$.
4. City/county assignment is based on zip code address. USPS zip code county file was used for the assignment. In the absence of a valid zip code, the jurisdiction was considered unknown. For 2002 census tract was the first order of priority to assign county.